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| 10/527,052 | 03/09/2005 | Shin Horiuchi | 040894-7196 | 6844 |
| 9629 7590 01/12/2009 MORGAN LEWIS & BOCKIUS LLP 1111 PENNSYLVANIA AVENUE NW WASHINGTON, DC 20004 | | | | |
| EXAMINER | | | | |
| BURKHART, ELIZABETH A | | | | |
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| 1792 | | | | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/527,052

Applicant(s)

HORIUCHI, SHIN

Examiner

Elizabeth Burkhart

Art Unit

1792

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 November 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3 and 7-9 is/are pending in the application.
- 4a) Of the above claim(s) 8 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 7 and 9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-8508)
- Paper No(s)/Mail Date _____

- 4) ☐ Interview Summary (PTO-413)
- Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

1. Claims 1-3 and 7-9 are pending in the application. Amended claims 1, 2, 7, and 9 and cancelled claims 4-6 have been noted. Claim 8 has been withdrawn as being drawn to a nonelected invention. The amendment filed 11/06/2008 has been entered and carefully considered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakao in view of Zhou et al and further in view of Beauvois et al or Hanus et al.

Nakao teaches a process for producing a PMMA-Pd metal cluster composite which comprises bringing PMMA (sheet) into contact with vapor of a heavy metal compound while heating. The heavy metal compound may be an acetylacetonate complex of palladium, platinum, or copper (p. 766-767).

Nakao does not teach contacting PMMA with the vapor of the heavy metal compound under ultraviolet irradiation, wherein said UV irradiation has a wavelength from 250 to 350 nm and a dose of 0.1 to 2 J/cm².

Zhou teaches a method of forming polymer-metal cluster composites wherein a polymer and metal compound (Au, Pd, etc.) are exposed to ultraviolet irradiation rather than a heat treatment for reduction of the metal ions in order to homogeneously disperse

the metal nanoparticles within the polymer matrix. The ultraviolet irradiation source is a mercury lamp having a wavelength of 253.7 nm. The polymer exemplified is polyacrylamide (PAM), but Zhou discloses that this method may be extended to prepare other polymer-metal cluster composites (Abstract, p. 379-380).

Beauvois teaches irradiating PMMA-copper acetylacetonate composite films with ultraviolet radiation to decompose the copper acetylacetonate to form copper within the film. Beauvois also teaches that decomposition of the copper acetylacetonate may be performed by heating or by direct energy beam (i.e. UV), wherein said energy beam has a dose within the claimed range (Abstract, p. 167, 170-171). Hanus teaches that a PMMA-metal cluster composite may be formed by decomposing CuAcAc by UV irradiation, wherein said irradiation has a dose within the claimed range (Abstract, p. 320).

It would have been obvious to one of ordinary skill in the art at the time of invention by applicant to expose the metal compound and polymer in the process of Nakao to ultraviolet irradiation rather than heat treatment as suggested by Zhou in order to homogeneously disperse the metal particles within the polymer matrix, especially since it was known in the art to expose the precursors of Nakao to ultraviolet irradiation to form polymer-metal cluster composites as evidenced by Beauvois and Hanus. Also, since Beauvois and Hanus disclose the same precursors as Nakao, one of ordinary skill in the art would have reasonably expected the dose of UV irradiation disclosed by Beauvois and Hanus to be successful in decomposing the precursors of Nakao to form the metal clusters within the polymer matrix.

Regarding Claims 1 and 2, Nakao teaches the PMMA sheet is brought into contact with the heavy metal compound vapor in a non-oxidizing atmosphere (nitrogen) (p. 766). Nakao teaches the PMMA sheet is brought into contact with the heavy metal compound vapor at a temperature (180°C) above the glass transition temperature of the PMMA sheet (105°C) (p. 766).

Regarding Claim 2, Hanus teaches that the metal nanoclusters may be formed in a predetermined pattern (p. 320).

Thus, claims 1-3 would have been obvious within the meaning of 35 USC 103 over the combined teachings of Nakao, Zhou, and Beauvois or Hanus.

3. Claims 7 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakao in view of Zhou et al and Beauvois et al or Hanus et al as applied above and further in view of Zhang et al.

Nakao, Zhou, Beauvois, and Hanus do not teach forming a predetermined pattern by masking.

Zhang teaches selectively decomposing platinum acetylacetonate using UV irradiation (excimer lamp) wherein a mask is employed to form a desired pattern of platinum on the substrate (p. 996).

It would have been obvious to one of ordinary skill in the art at the time of invention by applicant to use a mask as suggested by Zhang in the process of Nakao in order to selectively decompose the metal acetylacetonate complex to form metal clusters in a desired pattern.

Thus, claims 7 and 9 would have been obvious within the meaning of 35 USC 103 over the combined teachings of Nakao, Zhou, Beauvois or Hanus, and Zhang.

Response to Arguments

4. Applicant's arguments filed 11/06/2008 have been fully considered but they are not persuasive. Applicant argues that both Beauvois and Hanus require the formation of CuAcAc-PMMA cluster or film before the irradiation, whereas the claimed invention is directed to a substrate unassociated or unembedded with the heavy metal prior to irradiation. The examiner agrees that Beauvois and Hanus teach bringing PMMA into contact with the heavy metal compound prior to irradiation, rather than under UV irradiation as claimed. However, Nakao discloses bringing PMMA into contact with the heavy metal vapor under heat treatment and would reasonably suggest bringing PMMA into contact with the heavy metal vapor under UV irradiation when UV irradiation (excimer laser, mercury lamp, etc.) is used to decompose the heavy metal compound as an alternative to heat treatment.
5. Applicant argues that there would be no reasonable expectation of success in combining the teachings of Nakao with Beauvois and Hanus because the formation of the precursor PMMA-CuAcAc complex is critical in the cited references to form the cluster composite. The examiner disagrees. Beauvois and Hanus disclose using the same precursors (metal acetylacetonates, PMMA) as Nakao and Beauvois discloses that the acetylacetonate compound may be decomposed by heating or by direct energy beam such as UV irradiation. Thus, there would have been a reasonable expectation of success for decomposing the metal acetylacetonates of Nakao using UV irradiation

since Nakao, Beauvois, and Hanus all teach that the heavy metal compound is being decomposed to form metal clusters within the polymer matrix, regardless whether PMMA and the acetylacetonate are brought into contact prior to irradiation or heat treatment or under irradiation or heat treatment.

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Elizabeth Burkhart whose telephone number is (571)272-6647. The examiner can normally be reached on M-Th 7-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on 571-272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Elizabeth Burkhart/
Examiner, Art Unit 1792

/Timothy H Meeks/
Supervisory Patent Examiner, Art Unit 1792